



safe water
network



Decentralized Safe Water Kiosks: Working Toward a Sustainable Model in Ghana

About Safe Water Network

Co-founded in 2006 by actor and philanthropist Paul Newman, along with prominent civic and business leaders, Safe Water Network's mission is to develop innovative solutions that provide safe, affordable water to those in need. We bring together diverse capabilities to address the challenges of local ownership and sustainability. Working with the private and public sectors, we advance our field initiatives for broad replication. We also document and share this effort through forums, workshops, reports and case studies.

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Acknowledgements

Safe Water Network's Ghana initiative has received generous support from the PepsiCo Foundation and Newman's Own Foundation, for which we are grateful. This report benefitted from guidance from our partners and advisors. We wish to thank our Ghana expert advisory panel members: Dr. Kwabena Nyarko of the Kwame Nkrumah University of Science and Technology and WASHCost Ghana; Dr. Philip Gyau-Boakye of the Water Research Institute of the Council for Scientific and Industrial Research, Accra; and Mr. Minta Aboagye, hydrogeologist and former Director of Water at the Ministry of Water Resources, Works and Housing. Global advisors who contributed to this work included Gourisankar Ghosh, Chairman, Waterlife and former Executive Director of Water Supply and Sanitation Collaborative Council; and Mansoor Ali, water expert at AFPRO and former Senior Water Expert at UNICEF Water. Additional contributions were made by Melissa Opryszko, PhD (Johns Hopkins Bloomberg School of Public Health), Robert Williams (Against the Grain), and Jonathan Fanton (former President, MacArthur Foundation).

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August 2012

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Introduction

Safe Water Network set out in 2009 to demonstrate whether locally-owned, decentralized safe water systems could meet the demand for safe water in Ghana on a sustainable basis—and, if proven successful, whether the model could be quickly scaled up to reach many more people. Focusing on underserved populations in rural and peri-urban communities facing significant need, Safe Water Network funded the installation of five safe water kiosks¹ by WaterHealth Ghana (WHG), a subsidiary of WaterHealth International (WHI). A monitoring and evaluation program was implemented to determine the long term viability and potential to realize positive health outcomes.

The approach included charging a modest amount for the water, with prices set at a level that would be affordable to most or all members of a community. Through this revenue, WHI forecast that the water stations would be economically self-sufficient within one year of launch, and pay back their full capital costs (with a financial return to the funder) within eight years. Once these milestones had been achieved, the objective would be to transfer the stations to local ownership.

Safe Water Network also collaborated with The Johns Hopkins University (JHU) to undertake an independent 4-year² study evaluating the initiative's impact on local health outcomes. The study included water quality testing, an analysis of consumer behavior, and an evaluation of disease incidence rates. Researchers gathered baseline, midline and endline household data in four villages where Safe Water Stations were constructed. Water samples were collected from commonly-used drinking water sources and tested for the presence of *E. coli*. Community members were interviewed to determine demographics, socioeconomic characteristics, disease occurrence, hygiene practices, and awareness of the relationship between water and health. This survey data enabled researchers to track changes over time and to identify the extent to which each of these factors influenced a household's decision whether to purchase safe water. The study is currently in the final stages and a published report of findings is pending in 2012.

The five water systems were launched over a 19-month period, with the last one roughly 18 months behind schedule. Launch delays resulted from several startup challenges, including difficulties finding suitable sites and reaching satisfactory agreement with communities as well as unanticipated system modifications that were necessary to meet site-specific challenges. Once all sites had operated for a full year and the impact of seasonality was felt, a full analysis was conducted to determine what was working and wasn't. Sales volumes had fallen short of projections, and as a result sites did not generate sufficient revenue to cover operating expenses in the first year. Interim results

¹ Initially called "WaterHealth Centres", and currently known as "Safe Water Stations": a term introduced and trademarked by Safe Water Network in its India initiative.

² Initially, the study was to be a 3-year study; due to several delays to launch the initiative, the study was extended to 4 years.

from the JHU study also indicated that even though the water stations were consistently exceeding WHO health standards on water quality, villagers were recontaminating the water at alarmingly high rates. It was clear that demand generation and health and hygiene education programs were inadequate. Safe Water Network took immediate action, taking numerous steps to increase revenue, control costs, and address the health and hygiene education issues. In year two, revenues doubled and by the end of the year four of the five sites were covering operating costs. There is now documented evidence of significant health benefits due to the use of safe water.

This report details the specific challenges, how Safe Water Network addressed them, and the results achieved to date. The report also identifies the next set of priorities to ensure a smooth transition to locally owned and managed operations and to deliver lasting health benefits to these communities.

Background

Water Challenges in Ghana

As much as 43% of the population in West Africa³ lacks access to safe sources of water. In rural areas of West Africa, only 28% of the population has access to improved drinking water sources, and only 2% has a piped connection to the household.⁴ Many households in Ghana, faced with unavailable or unreliable access to potable water, have no choice but to use contaminated sources. Safe water access is particularly scarce in rural and peri-urban areas.

In the Ga West district of the Greater Accra Region, where four of the five stations owned by Safe Water Network are located (see Table 1), most households collected water from local rivers. A 2009 study of one of these rivers found the entire basin unsuitable for untreated home use due to high levels of fecal coliforms.⁵

In the South Dayi district, where Safe Water Network's fifth station is located, most households collect water from Lake Volta, which registers high levels of bilharzia (schistosomiasis) and diarrhea-causing bacteria. Some purchase water from private well operators or from traders who deliver it by tanker truck, handcart, or sachet. Water from these sources varies significantly in quality, and is often unsafe to drink.

³ UNICEF 2006

⁴ JMP Data 2010

⁵ Physico-Chemical and Microbial Water Quality Assessment of Densu River of Ghana A. Y. Karikari and O. D. Ansa-Asare CSIR-Water Research Institute, P. O. Box M.32, Accra, Ghana

Table 1. Sites of Safe Water Stations

District	Community	Population
Ga West	Amasaman	6,000
	Pokuase	16,000
	Obeyeyie ⁶	2,500
	Oduman	2,500
South Dayi	Dzemeni	7,700
Total		34,700

Water-related diseases such as diarrhea, bilharzia, Buruli ulcer, onchocerciasis (river blindness), trachoma, intestinal worms, and elephantiasis are endemic in Ghana; the lack of safe water and improved sanitation systems contributes to 70% of diseases in the country.⁷

Investment in the water sector by the Government of Ghana has often fallen short of expectations; for example, the discrepancy between the approved budget and actual disbursements from the government to the Community Water and Sanitation Agency increased from 34% in 2006 to 91% in 2010, affecting the performance of sector institutions and resulting in implementation delays.⁸ By 2025, the population of Ghana is expected to grow from 24 million to 33 million.⁹ It is therefore likely that the demand for affordable, potable water will continue to outpace the national government's ability to provide the service.

Safe Water Network's Ghana Initiative

Although the Ghana government, multi-laterals and philanthropic organizations have attempted to address the challenge of safe water provision in Ghana, those efforts have often been inadequate to provide long-lasting solutions.¹⁰

In order to address these challenges, Safe Water Network established a partnership with WHI, which included the installation of five "Safe Water Stations" in 2009. The approach undertaken by Safe Water Network was to incorporate best practices from the private sector, with particular emphasis on sustainability and scale. Priorities included:

⁶ The Safe Water Station at Obeyeyie was not included in the assessment by JHU.

⁷ Source: African Economic Outlook 2007 - Ghana Country Note. <http://www.oecd.org/dataoecd/26/51/38562673.pdf>, p. 293.

⁸ MWRWH (2012). *Water Sector Strategic Development Plan*, pg. 22.

⁹ Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, *World Population Prospects: The 2010 Revision*, <http://esa.un.org/unpd/wpp/index.htm>. Accessed 16 April 2012.

¹⁰ IRC's Triple-S Project (2010) estimates that 29% of water facilities in rural areas are not functioning, with an additional 49% classified as partially functioning. Roughly 40% of the population is yet to be adequately served with potable drinking water, according to MWRWH's 2010 *Water and Sanitation Sector Performance Report*.

- Engaging with community members and local leadership to secure early buy-in and ensure lasting household participation.
- Building awareness of the importance of safe water through health and hygiene education.
- Establishing local sustainability (operational, economic, cultural and environmental).
- Developing the framework for a scale proposition¹¹ and advancing relationships with organizations that have the reach and resources to support broad replication.
- Monitoring performance continuously and adjusting practices as needed.

Safe Water Network and WHI agreed upon a range of criteria that would be used to evaluate project success, a selection of which are presented in Table 2:

Table 2. Criteria for Success

Factor	Metric
Quality	Water quality meets WHO and Ghana guidelines (microbial, physical and chemical)
Awareness	Community members demonstrate understanding of proper hygiene practices and the link between drinking water and health
Adoption and Use	Minimum of 10% adoption after 60 days Household penetration to reach 75% Each adopting household using 10L per day
Economic Sustainability	Sales sufficient to cover operating costs, with surplus for maintenance reserve and capital repayment
Uptime	System operates 12 hours per day, 7 days per week
Maintenance	Needed preventative maintenance undertaken daily Monthly maintenance report completed by engineer

By 2010, it was clear that the Ghana initiative's achievements were not in line with objectives. Volumes at four of the five sites were well below levels required to cover operating costs (before covering management fees paid to WHG). Household

¹¹ A "scale proposition" represents an opportunity for Safe Water Network to leverage its expertise and partnerships to provide more than one hundred thousand people with access to safe water through a single integrated program initiative.

penetration¹² levels averaged less than 20%, against a target of 75%. Unable to recover costs, WHG doubled the price of 20L of water from 5 to 10 pesewas in the fourth quarter of 2009, and sales declined by more than 30% over the next three months. There was also evidence that water was frequently recontaminated by consumers after sale through unsafe handling during transport and storage. Further, treated water at two of the four Safe Water Stations tested by JHU was positive for *E. coli*.

Since the initiative was falling short on multiple levels, there was a need for a significant change in program design and management.

Problem-Solving Approach

To address the shortfalls, Safe Water Network assumed primary management responsibilities for the Ghana initiative. Initially, Safe Water Network's role had been that of a funder and advisor, who worked with WHG to set operational policies and respond to any issues. With the change in management, the following additional responsibilities transferred from WHG to Safe Water Network:

- Coordinating with communities on site management issues.
- Managing capital expenditures, site improvements, and increased water distribution.
- Setting prices and establishing promotions and subsidies.
- Collecting revenues and disbursing payments.
- Maintaining program initiatives including hygiene education.
- Managing the project's monitoring and evaluation initiatives.

WHG maintained responsibility for day-to-day operations, including management of site operators and routine system maintenance. Safe Water Network agreed to increase the monthly management fee paid to WHG to help that organization minimize its operating deficit. In addition, an incentive system was established to reward WHG for achieving performance targets.

After taking responsibility for management, Safe Water Network implemented a set of changes with four objectives: 1) raising adoption rates; 2) raising local health and hygiene awareness; 3) ensuring water quality at point-of-use; and 4) improving performance monitoring.

¹² "Household penetration" is the proportion of households who purchased water from a Safe Water Station within the past month.

Objective I: Raising Adoption Rates

One major roadblock identified in the early stages of the initiative was the lower-than-expected rate of adoption by households. The target household penetration levels were 75% within 500m of the Safe Water Station and 45% community-wide; however, observed penetration at most sites was only around 20% in 2010. Monthly usage among adopting households displayed a high degree of seasonal fluctuation (see Figure 1 below), with consumers turning to other water sources during the rainy season. As a result, during certain months, capacity utilization at the sites was very low, creating a high need for subsidies.

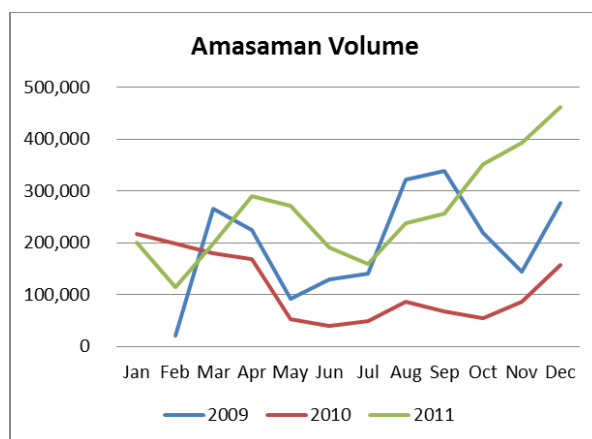


Figure 1. Seasonal fluctuations in sales volumes, Amasaman

Low adoption and seasonal fluctuations limited the initiative's ability to deliver its expected health benefits and to achieve the long-term financial sustainability that would enable a successful transition to local ownership. Safe Water Network undertook two strategies to address this issue: 1) understanding and meeting the demand for convenience; and 2) generating demand through consumer promotions.

1. Understanding and meeting the demand for convenience

Initial assessment:

Safe Water Network undertook a mapping exercise to better understand consumer needs and improve the efficiency of distribution. This exercise involved:

- Training field data collectors.
- Collecting household characteristics (water usage, frequency of access, distance to access points, number of persons per household etc.).
- Completing GPS mapping of households, distribution sites and alternative water sources.

- Analyzing optimal siting for additional remote kiosks.

The results of this process (shown in Figure 2), as well as data from the JHU study, revealed that the proximity to the water site is a major determinant of adoption. The data showed a significant drop-off in consumption beyond a distance of 100 meters from the main site, and a further drop-off beyond 200 meters.

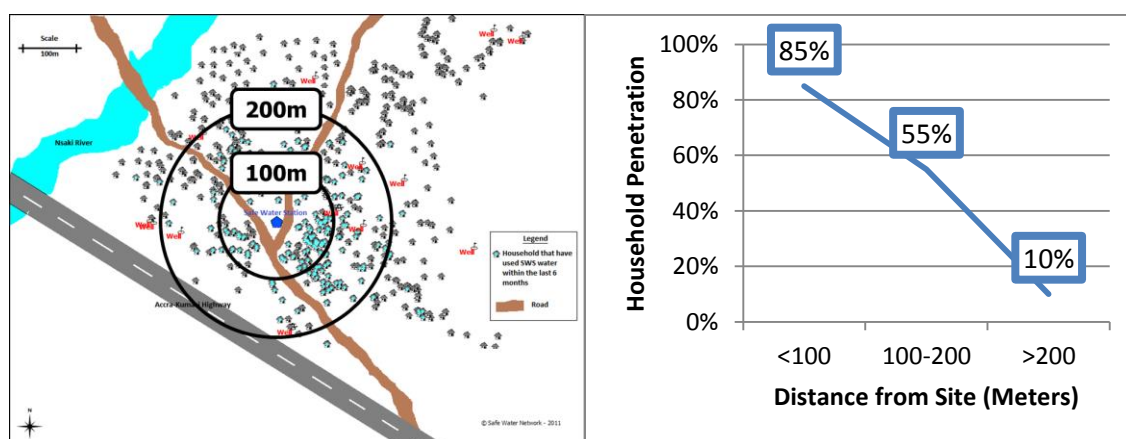


Figure 2. GPS household mapping exercise, Pokuase

Response:

In response to this finding, Safe Water Network established remote kiosks, connected by pipeline to the Safe Water Stations. These kiosks provided convenient access for those who lived farther from the main site, and each was constructed at a cost some 70-90% lower than building a new Safe Water Station. The addition of delivery trucks further expanded distribution to more remote households.



Left: Safe Water Station (Pokuase). Right: Remote Kiosk (Dzemeni)

Result:

The remote kiosk strategy was first employed at Dzemeni, where two kiosks were added in April 2011, selling water at the same price as at the main site (0.10 GHS, or ~\$0.07, per 20L). Another 3 kiosks were added in Pokuase in October 2011. Dzemeni is a rural market center and fishing village on the shores of Lake Volta, while Pokuase is a peri-urban community on the outskirts of Accra. Despite the differences between the two communities, adding remote kiosks significantly increased sales volumes at both sites. However, the details of these volume shifts were different: Figure 3 (below) shows volumes for the month before the remote kiosks launched, as well as the three months after launch. Dzemeni, with few competing sources of safe drinking water, experienced very high cannibalization of sales at the main site. Nonetheless, volumes increased overall, due to the addition of new customers. Remote kiosks led to little or no cannibalization at Pokuase, with volume increases resulting instead from the kiosks' proximity to new population clusters.

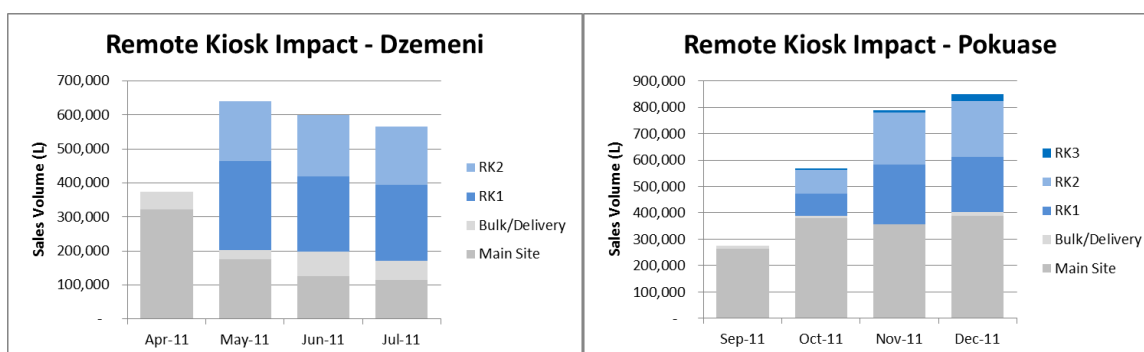


Figure 3 - Impact of remote kiosks on sales volumes

A comprehensive analysis of the impact of remote kiosks cannot be completed until they have operated for at least a year (to account for seasonality); however, monthly water sales at both Dzemeni and Pokuase have been on average roughly twice as high since the kiosks were introduced. To date, four of the five remote kiosks are covering incremental operational costs. This result underscores the crucial importance of convenience in consumer decisions, and the economic benefits of remote kiosk clustering systems.

Safe Water Network also addressed the demand for convenience through the addition of a truck delivery program at two Ga West sites in March 2011. To cover transportation costs, truck-delivered water was priced at 0.225 GHS (~\$0.16 at the time delivery was introduced),¹³ more than twice as high as the 0.10 GHS rate (~\$0.07) at the main site (with a discount for bulk orders). Delivery volumes began at around 70,000L monthly per truck, and rose to the current average of 200,000L. The trucks currently cover their

¹³ As of the writing of this report (Aug. 8, 2012), the conversion rate has changed. 0.225 GHS equals ~\$0.12; 0.10GHS equals ~\$0.05.

cost of operations (fuel, driver salaries, routine maintenance and insurance) and generate marginal surpluses. However, volumes have not yet reached the estimated 260,000L per month needed to cover capital recovery and depreciation.

Responding to the demand for convenience greatly improved the financial sustainability of the sites: Dzemeni, Pokuase and Obeyeyie are currently covering their operational expenses and management fees. The lessons learned at these sites will inform future expansion, allowing for more cost-effective impact and increasing the potential to take initiatives to scale.

2. Generating Demand through Consumer Promotions

Initial assessment:

As described above, lower-than-expected rates of adoption and utilization challenged the Ghana initiative's ability to deliver its intended health benefits and to achieve its financial objectives. An additional strategy that Safe Water Network employed to address this challenge was to develop new consumer promotions to generate additional demand.

Response:

Safe Water Network contracted marketing officers to help develop these promotions. With these marketing officers, Safe Water Network adopted the following three strategies:

- Implementing a “buy three, get one free” holiday promotion at four sites from December 2010 to January 2011.
- Introducing customer tally cards at each site to track purchases and provide incentives for repeat customers.
- Providing site operators with target-based incentives.

Result:

Sales volumes at sites participating in the holiday promotion increased by 55%. Although there was a slight decline in sales after the promotion program ended, there are indications that some new customers were retained. Unfortunately, the tally card system was not yet in place at the time of the promotion, and the tracking of customer behavior was incomplete (see page 12, “Objective IV: Improving Performance Monitoring”) so the effects of the promotion cannot be precisely determined.

Objective II: Raising Local Health and Hygiene Awareness

Initial assessment:

Although increasing local health and hygiene knowledge was one of the original criteria for project success, a 2010 assessment revealed low awareness of both the importance of safe water and the methods for avoiding recontamination in the home. The initiative's

existing health and hygiene education efforts were therefore determined to be inadequate.

Response:

In 2011, Safe Water Network commissioned an independent consultant (WASHealth Solutions) to evaluate the existing health and hygiene education program and propose improvements. The enhanced education program included expanded outreach at local schools and churches and on radio programs, door-to-door campaigns, and incentive programs for volunteers. Safe Water Network tested a variety of outreach strategies in order to tailor its communications for maximum behavior change impact. Different poster designs were developed, using a community participation approach to create effective, understandable messaging.



Left: Sample education materials. Right: School-based health and hygiene training

Safe Water Network also re-organized local health and hygiene education teams, and established a budget of ~\$200 per month per site to provide financial incentives, t-shirts, training certificates, and transportation reimbursements for education volunteers.¹⁴

Result:

The full effects of health and hygiene education and resulting changes in behavior may not be realized for some years; however, expanded awareness of the health impacts of safe water have likely contributed toward the significant increases seen in sales volumes, including a 151% year-over-year increase between Q4 2010 and Q4 2011 (shown in Figure 4 on page 13). Future work will be undertaken to better quantify the impact of consumer programs relative to increases due to the improved distribution strategies described above.

¹⁴ Currently, 43 student and 10 teacher graduates of the Safe Water Network health and hygiene training program are active in 8 schools. 27 volunteers have also been trained and are active in the 5 communities.

Objective III: Ensuring Water Quality at Point-of-Use

When treated water at two of the five stations was found to be contaminated with low levels of *E. coli*, Safe Water Network shut down water production at both sites, thoroughly cleaned the systems and replaced the sand and carbon. Operators were trained to follow new standard operating procedures (for instance, ensuring that hoses were kept off the ground) to reduce potential sources of contamination. Once the system was restarted, another round of quality tests showed that the contamination had been eliminated, and the problem has not reappeared to date. Currently water from all sites meets both WHO and Ghanaian standards for drinking water quality.

However, maintaining this level of quality after the water leaves the station is challenging in community-level systems. JHU's assessment recommended two measures to improve quality assurance: addressing recontamination with improved containers, and protecting water quality through chlorination.

1. Addressing Recontamination with Improved Containers

Initial Assessment:

JHU researchers found that some of the treated water sold at Safe Water Stations was being re-contaminated through consumer handling during transport and household storage. In some cases, consumers who dipped their hands into water containers likely introduced microbial contamination that made the water once again unsafe for drinking; additionally, the containers themselves were thought to be contaminated.

Response:

A pilot initiative at Dzemeni introduced narrow-mouthed containers and enforced their use for water collection in an effort to address the issue of household recontamination. The narrow mouths on these vessels prevent household members from dipping their hands into the water. The containers were distributed through a promotion in which consumers paid 1.50 GHS and received both a container and a coupon good for 600 L of water (which itself would have cost 1.50 GHS at the time).

Result:

The JHU study is expected to provide some indication of the impacts of the container program; while these results are not yet available, preliminary results indicate a significant reduction in *E. coli* contamination in the village households where improved water vessels were introduced.

2. Protecting Water Quality through Chlorination

Initial assessment:

While the addition of remote kiosks at Dzemeni and Pokuase led to an increase in sales, it also introduced a new potential source of recontamination, as the water was piped long distances from the main site after being treated. This created a need for residual

protection for the water sold at the remote kiosks. Chlorination also helps to further protect against re-contamination in the household.

Response:

Chlorination systems have been installed at all the five sites.

Result:

At sites that currently employ chlorination, there has been no negative impact on sales. Safe Water Network will monitor consumer preferences around taste closely to ensure that the addition of chlorine does not reduce demand. Monitoring of consumer taste preferences is underway, but early indications are that many consumers actually prefer the taste of slightly chlorinated water.

Objective IV: Improving Performance Monitoring

Initial Assessment:

While some performance parameters were being tracked prior to 2011, this was limited to financial data (income and expenditure), sales volumes, wastage volumes, and daily meter readings. Observations from the JHU study, consultations with advisors, and Safe Water Network's own experience revealed that this basic level of data collection was inadequate to the project's purposes: key questions of site performance, equipment functioning, and consumer behavior were left unanswered, hindering Safe Water Network's ability to evaluate both the health impacts and the financial and operational sustainability that were essential to the initiative's success.

Response:

Monitoring and evaluation of site performance were made significantly more robust in 2011. Site supervisors and operators were trained to undertake periodic recording and data processing on an hourly, daily, weekly, and monthly basis, while additional data on customer attitudes and behavior are gathered through home visits and interviews. Mobile phones and email transmit data to headquarters for further processing, review, and analysis. In recognition of the importance of this work, Safe Water Network hired a full-time Monitoring and Evaluation Coordinator in 2011 to manage this program going forward.

Safe Water Network now collects and analyzes data on a wide range of parameters to measure and improve operations and understand program impact:

- Number of households that patronize the safe water kiosks daily.
- Number of persons served daily.
- Volume of water sold per day per site.
- Total hours of generator use.
- Total hours of downtime.

- Percentage water wastage daily.
- Age and gender of persons purchasing water.
- Alternative sources of water to the households.

Result:

Daily feedback mechanisms and regular technical support visits aid in problem solving and performance improvement. In the absence of an electronic database facility at the sites, Safe Water Network uses its customer tally cards to manually record volumes purchased per visit, date, and location. This customer information enables Safe Water Network to adjust staffing, hours of operation, pricing, and other parameters as needed, and also improves future site selection and model development.

Overall Effect on Sales Volumes

After the evaluation in 2010 and Safe Water Network's implementation of the initiatives outlined above, the sites experienced significant improvements in the quality and consistency of outcomes. This improved performance has further contributed to the refinement of the Safe Water Network decentralized water kiosk model.

Figure 4 below shows the combined year-over-year changes in sales volumes at all sites in Ghana, with each quarter compared to the same quarter in the prior year. The data show a dramatic reversal: sales volumes were in decline until Q1 2011, when reforms began. Volumes then began to recover, and figures from the most recent quarter (Q4 2011) show a 151% increase over the same quarter in 2010.

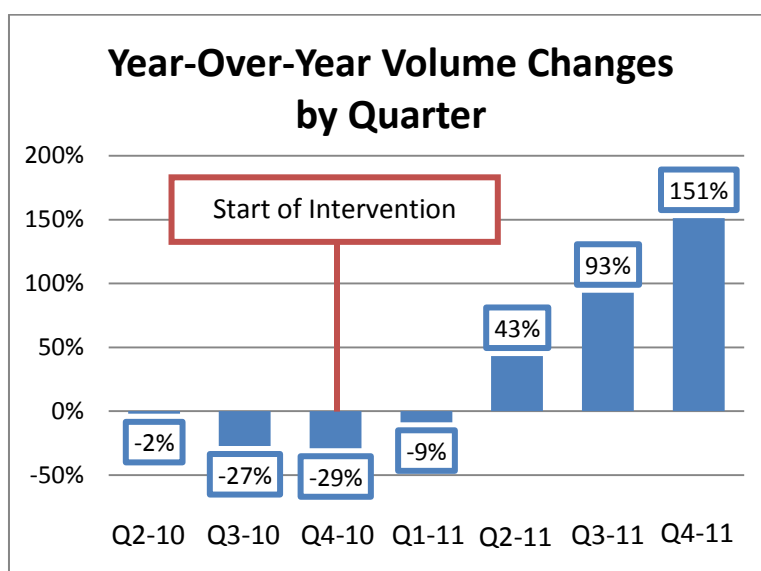


Figure 4. Year-over-year volume changes at Ghana sites

Sales continued to show a high degree of seasonality, with declines during the rainy seasons in May-July (major) and October-November (minor), when many utilize rainwater harvesting for their daily water needs. Levels quickly recovered in August when the major rainy season ended, which may be a result of intensified health and hygiene efforts.

Thanks to the streamlining of operations and the growth in sales volumes, Safe Water Network's Ghana sites are moving toward financial sustainability. As a critical first step on the pathway to sustainability, four of the five sites are currently generating revenues sufficient to cover their operating expenses (excluding the external management fee), while three sites (Dzemeni, Obeyeyie and Pokuase) cover operating expenses even after the management fee. The next section describes Safe Water Network's priorities for continued improvement of these sites, as well as expansion into new areas of Ghana.

Priorities Going Forward

Safe Water Network continues to improve the decentralized water system model with a focus on effectiveness, efficiency, affordability, sustainability, and scalability. Based on the experiences, challenges, and successes discussed above, Safe Water Network is introducing the following improvements.

1. Improving Current Sites

Meeting Operational Targets

With insights from its field experiences to date and its expanded monitoring and evaluation program, Safe Water Network continues its work to optimize its operations in order to deliver safe water affordably and reliably. Operational improvements are focused on four areas: 1) reducing production costs from the current US \$0.046 per 20L to approximately US \$0.035 through the use of new technologies and operating procedures; 2) reducing wastage from 5-6% to below 5%; 3) reducing downtime from 9% to 7%; and 4) improving system capacity. Further details on targets can be found on page 18 (Exhibit I: Key Performance Indicators).

Performance in Oduman has been weak as the site struggled with water quality and plant downtime: the result of source water quality issues, unstable electrical supply, and periodic breakdown of pumps and electrical equipment – problems that to varying degrees have affected several other sites as well. Solutions now being implemented to address these issues include:

- Dredging, and possibly relocating sources.
- Connecting electrical power from distribution sites to the water source, preventing the need to physically carry generators during periods of power outages, and installing electrical stabilization equipment.

- Providing cellphones to site supervisors for prompt reporting of issues, and motivating site staff performance through incentives.

Expanding Remote Kiosks and Truck Delivery

The use of remote kiosks at Dzemeni and Pokuase has shown a clear impact on sales volumes, reflecting the importance of convenience in consumer choices.¹⁵ In light of this finding, Safe Water Network will launch two remote kiosks at Oduman and one at Obeyeyie in Q3 (2012). Two remote kiosks will be launched in Q4 (2012) in Amasaman. Two delivery trucks have been deployed in Ga West and can collect water from any of the Ga West sites depending on the availability of treated water, enabling better capacity utilization and customer coverage. As one step toward further distribution improvements, Safe Water Network is undertaking 'whole-community mapping' which will expand beyond the already-mapped 500 meters at all Ghana sites, taking into account planned expansions with remote kiosks.

Ensuring Water Quality at Point-of-Use

The container pilot program at Dzemeni has been a clear success, with the majority of customers there now using the containers. Dzemeni has also recorded the lowest rates of recontamination of any of the sites, which is likely to be attributable in large part to the 2,000 containers introduced there. In Q4 2012, Safe Water Network will extend the container program to other sites in Ghana, distributing an additional 4,000 containers to reduce recontamination of water in the home and promote usage. Chlorination is being used at all five sites.

Improving Community Mobilization and Engagement

In addition to providing insights that led to delivery improvements, the GPS mapping of households within 500 meters of sites has improved Safe Water Network's understanding of consumer behavior. Going forward, outreach and educational efforts will be intensified through an expanded use of mass media, home visits, and training volunteers, school children and organized community groups.

Transition to Local Ownership and Management

Safe Water Network is now working to organize the transition of management control and ownership of its sites to a local authority. This process is expected to take 24-36 months. A transition plan for each site will include a recommendation on the feasibility of capital recovery and, as determined on a case-by-case basis, the need for subsidies (capital forgiveness).

¹⁵ See "Understanding and Meeting the Demand for Convenience," pg. 6.

2. Refining Models through Expansion Sites and Scale Programs

Despite successes to date, challenges remain that make it difficult to take the existing model to scale.

1. Financial results are not sufficient for meaningful capital recovery (and would be worse in poorer or smaller communities).
2. Operating complexity means that handover to local ownership remains a challenge.

Safe Water Network is working to address both of these issues through two pilots currently underway in the villages of Aveme and Akateng, near Dzemeni in the Volta Region. Both of these sites will employ a modular slow sand filtration (SSF) technology, which is simpler to operate than the ultraviolet treatment systems used at current sites and which has the potential to greatly reduce operating costs. Aveme will also enable Safe Water Network to explore models to serve far poorer communities. With cost savings from the use of SSF, it is expected that Akateng will be able to repay capital within 8 years, and Aveme will be able to cover its operating costs and build a small surplus for maintenance. Further expansion will focus on additional Lake Volta communities and a number of villages in the Western Region, though sites in the Greater Accra Region will also be considered.

In addition, Safe Water Network will investigate candidate scale propositions and implement 1-2 of these if they are determined economically viable and if the necessary partnerships for funding and implementation can be secured. If such programs are implemented, it will greatly expand Safe Water Network's reach and impact in Ghana.

3. Expanding Safe Water Network's Knowledge Base

Safe Water Network is currently completing a Market Assessment (supported by the Conrad N. Hilton Foundation) to evaluate the potential for commercial solutions to address the need for safe water in Ghana. A particular focus of the work is on remote, poor regions, hybrid models (combining commercial and subsidy mechanisms), and locally-appropriate technologies. Safe Water Network is evaluating a range of models in order to better identify the most cost-effective, sustainable solution for a given project setting.

4. Developing Partnerships for Expansion

This interim review of Safe Water Network's project in Ghana provides the basis for developing expansion propositions for decentralized water systems in Ghana. Parallel to developing new field initiatives, Safe Water Network is advancing cross-sector opportunities that will include private sector, non-profit, government agencies and foundation supporters to advance the development of innovative solutions.

Conclusion

This initiative has made significant progress in developing sustainable safe water provision models for rural and peri-urban markets in Ghana. Many of the findings to date echo what has been established in other geographies – such as the need for narrow-mouthed containers to prevent recontamination. Others may be more specific to local conditions – such as the steep decline in sales observed within the first few hundred meters of distribution sites.

Safe Water Network continues to build on its existing knowledge base to reduce costs, increase effectiveness, and strengthen partnerships. The goal of this iterative process is to develop viable models that can be broadly replicated to address the substantial challenge of safe water provision for underserved populations in Ghana and around the world.

Exhibit I: Key Performance Indicators

Measures	Targets	2010 (est.)	YE 2011	2012 Obj.
Consumer				
Access w/in 500m	90% population	39%	60%	82%
HH Penetration	75% w/in 500m	25%	52%	75%
Operational/Technical				
Water Quality	No microb. contaminants	Pass	Pass	Pass
Op. Failure Rates	<5% downtime	18%	9%	7%
Wastage	<5% total water produced	25-30%	5-6%	<5%
Technology	Affordable, locally maintained/operated	No	No	No
Production Cost	<2c/20L (at effective cap.)	(w/o WHG fee) \$0.059	\$0.049	\$0.034
		(w/ WHG fee) \$0.087	\$0.091	\$0.057
Financial				
P&L	120% total opex covered	67%	61%	79%
Capex	Capex recovery	None	None	Begin recovery @ 1 site
Market				
Hygiene Promotion	Reach 10% pop/month	<2%	<5%	5-10%

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